

The invention claimed is:

1. A hand treatment agent dispenser comprising:

a housing;

means on said housing for storing the agent;

at least one port on said housing;

means on said housing coupled to said means for storing and to said port for discharging said agent from said means for storing and out from said dispenser through said port; and

a unique identifier on the dispenser.

2. The dispenser of claim 1 and further comprising:

means on said housing for connection to a user.

3. The dispenser of claim 2 and wherein:

the means for connection comprises an elongate extension having a proximal end at said housing and having a distal end.

4. The dispenser of claim 3 and wherein:

the means for connection further comprises means coupled to said distal end for attachment to clothing worn by said user.

5. The dispenser of claim 4 and wherein:

the weight of said dispenser filled with said agent is between 1 and 5 ounces.

6. The dispenser of claim 4 and wherein:

said dispenser is elongate, having a front end and a rear end,

said port being proximate the front end, and said means for connection being proximate the rear end for hanging the dispenser from the clothing with the port always below the location of attachment to the clothing.

7. The dispenser of claim 6 and wherein:

the overall length of said dispenser from the front end to the rear end is about 15 cm.

8. The dispenser of claim 1 and wherein:

said means for storing has a predetermined capacity for storing the agent; and

the means for discharging includes means for enabling sequential discharging events and limiting the volume of the agent discharged upon each event to a predetermined amount less than the capacity of the means for storage of the agent.

9. The dispenser of claim 8 and wherein:

said means for storing has a capacity between 10 and 75 ml., and

said means for enabling is arranged to limit the volume discharged upon each event to an amount in a range from 0.5 ml. to 3.0 ml.

10. The dispenser of claim 8 and wherein said means for enabling further comprises:  
a piston pump having a user press operator pad on said housing to dispense said agent by  
pressing and displacing said pad from a rest position.

11. The dispenser of claim 10 and wherein:  
said means for storing is a flexible fluid-reservoir.

12. The dispenser of claim 1 and further comprising:  
means on said housing coupled between said means for storing and said means for  
pumping, for enabling introduction of the agent through said port into said means for storing said  
agent and, for enabling the discharging of said agent from said means for storing, out through  
said port.

13. The dispenser of claim 1 and further comprising:  
means on said housing for receiving a guide in a control station.

14. The dispenser of claim 13 and wherein:  
said means for receiving a guide includes notches in sides of said housing.

15. The dispenser of claim 13 and further comprising:  
means on said housing for connection to a user and comprising an elongate extension  
having a proximal end at said housing and having a distal end; and wherein  
the means for receiving a guide include notches in said extension.

16. The dispenser of claim 13 and wherein said means for receiving a guide includes:  
an opening through said housing and having means facilitating reception of a guide rod  
therein.

17. The dispenser of claim 16 and wherein:  
said means for facilitating include a sloping entry portion in the housing and extending  
from an exterior surface of the housing into said opening.

18. In a system for monitoring hand cleaning activity, the combination comprising:  
a plurality of hand cleaning agent dispensers, each dispenser having a housing and a  
unique identifier identifying that dispenser and distinguishing it from the others of said  
dispensers, and each dispenser having means for storing hand cleaning agent, and each dispenser  
having a port for filling the means for storing, and each dispenser having means operable, when  
actuated, to cause a dispensing event to dispense hand cleaning agent from said dispenser;  
a signal processor;  
a control station operable with said dispensers to receive said dispensers upon return to  
the control station by the users of the dispensers, re-fill said returned dispensers with said hand  
cleaning agent, and release said re-filled dispensers to users, said control station having:  
means coupled to said processor for reading and recording the dispenser identifier after  
return and admission of a dispenser to the control station;  
means for re-filling a dispenser with said agent; and

means for reading a dispenser identifier and coupled to said processor for recording the amount of said agent used to re-fill the dispenser and recording the release of the re-filled dispenser from the control station.

19. The combination of claim 18 and wherein said control station further comprises:
  - means for recording in said processor the date and time that the control station admits a returned dispenser; and
  - means for recording in said processor the date and time that said re-filled dispenser is released from the control station.

20. The combination of claim 19 and wherein:
  - said control station has a user identifier recognition device co-operable with a user's identifier and with said dispenser identifier and with the means for recording date and time, and coupled to said processor to relate a dispenser to a user and the date and time of release and the date and time of return of the dispenser, in a record; and
  - said control station has agent quantity measuring means operable with said dispensers individually and coupled to said processor to measure the quantity of said hand cleaning agent used in filling an individual dispenser.

21. The combination of claim 18 and wherein:
  - said dispensers are portable, sized to be held in a hand, with the actuator operable by a part of the holding hand.

22. The combination of claim 18 and wherein:  
said dispensers are adapted to attachment to a health care worker and display outside the  
worker's clothes.

23. The combination of claim 18 and wherein:  
said control station comprises said processor, a user input station, a dispenser check-in  
station and a dispenser check-out station, said user input station being coupled to said check-out  
station and to said check-in station for enabling users to check-out and check-in said dispensers.

24. The combination of claim 23 and wherein:  
said dispensers have a front end and a back end; and  
said control station has a front and a back with the dispenser check-in station and check-  
out station of the control station being at the front of the control station, and adapted to receive  
the dispensers, front-end first at the check-in station and release said dispensers, rear end first, at  
said check-out station.

25. The combination of claim 23 and wherein:  
said dispenser check-in station is located above said check-out station for promoting  
passage of dispensers from the check in station to the check-out station by gravity.

26. The combination of claim 23 and wherein:  
said check-out station includes a dispenser filler to fill said dispensers individually with  
hand cleaning agents.

27. The combination of claim 26 and wherein:

said check-out station is so-coupled to said user input station to enable said filler to fill a dispenser upon recognition of the identifier of a user checking-out the dispenser and then fill with the agent specified by the checking-out user, and then store in said processor's memory, information identifying the checking-out user, and identifying the dispenser, and identifying the specified fill agent, and the quantity of agent required to fill the dispenser, and the identification of the previous user of the dispenser, and the time and date of check-out of the dispenser to the checking-out user.

28. The combination of claim 26 and wherein:

said filler includes a fluid flow electronic reader coupled to said processor to store data representing the quantity of agent required to re-fill a dispenser.

29. The combination of claim 26 and wherein:

the control station includes a dispenser weighing device to weigh the dispenser after filling, said weighing device being coupled to said processor to store data representing the quantity of agent required to re-fill a dispenser.

30. The combination of claim 29 and wherein:

the dispenser weighing device is located at the check-in station and is adapted to weigh the dispenser before re-filling.

31. The combination of claim 26 and wherein said dispenser filler comprises:  
a fluid injection head for coupling to the said port of a dispenser.
32. The combination of claim 31 and wherein said check-out station includes:  
a holder with said fluid injection head mounted on the holder, the holder being movable  
from an idle position to a dispenser filling position to a dispenser ejection position;  
a series of holder position sensors, one for sensing holder idle position, one for sensing  
dispenser filling position and one for sensing dispenser ejection position; and  
powered means operable when activated, to drive said holder from said idle position to  
said dispense filling position to couple said injection head to a dispenser port, and to drive said  
holder from said filling position to said ejection position to eject a dispenser from its location  
after it was being filled.
33. The combination of claim 32 and wherein said injection head further comprises:  
a fluid filling pin and seal means receivable in said port of a dispenser; and  
means for biasing said pin into a rest position in said head, said pin being movable away  
from said rest position and against the urging of said biasing means upon coupling said head to  
said dispenser and for engagement with a pin-position sensor coupled to said powered means to  
de-activate said powered means when said filling pin is sealed to said dispenser port.

34. The combination of claim 33 and wherein:  
the dispenser filler further comprises a refill pump coupled to said filling pin; and  
said powered means and said dispenser filler are coupled to said pin position sensor to  
de-activate said powered drive means and activate said refill pump when said pin position sensor  
is operated.

35. The combination of claim 34 and wherein:

said holder is a carriage; and

said powered means is a carriage linear drive screw coupled to said carriage.

36. The combination of claim 34 and wherein the dispenser filler further comprises:

a pressure sensor coupled to said refill pump to de-active said pump in response to

achievement of a pre-selected pressure.

37. The combination of claim 34 and wherein the dispenser filler further comprises:

a fluid flow reader coupled to said injection head and to said processor to read and record  
the amount of fluid received from said refill pump.

38. The combination of claim 23 and wherein said user input station comprises:

a user operable keypad coupled to said processor for user entry of data;

a user identifier reader coupled to said processor; and

a data display coupled to said processor.

39. The combination of claim 18 and further comprising:  
transport guide means on said control station; and  
guide follower means on said dispensers;  
said guide follower means cooperating with said transport guide means and thereby aligning said dispensers for stacking in said control station and controlling travel from the check-in station to the check-out station.

40. The combination of claim 39 and wherein:  
each of said dispensers has a guide receiver hole therein;  
said dispensers are stacked in a stack in said control station;  
a transport control rod in said control station is received through said holes in said stacked dispensers, said rod being vertically reciprocable between a dispenser admission inhibiting position and a dispenser release inhibiting position.

41. The combination of claim 40 and wherein said control station further comprises:  
a dispenser return slot to receive dispensers from which hand cleaning agent has been dispensed; and  
an alignment ramp down from said return slot toward the top of the stack to receive a returned dispenser and orient it for reception of the top of the transport control rod in the guide receiver hole in the returned dispenser.

42. The combination of claim 39 and wherein:

said dispensers in said control station are stacked in direct contact of each dispenser in the stack with the dispenser immediately above it in the stack.

43. In a system for monitoring hand cleaning activity, the combination comprising:

a plurality of hand cleaning dispensers, each dispenser having a housing and means for storing hand cleaning agent, and a port for filling the means for storing, and having means operable, when actuated, to cause a dispensing event to dispense the hand cleaning agent from the dispenser;

a signal processor;

a control station operable with said dispensers to receive said dispensers upon return to the control station by users of the dispensers, re-fill said dispensers with said hand cleaning agent, and release said re-filled dispensers to users, said control station having means coupled to said processor for recognizing and recording an identifier unique to the user of a dispenser for release of a dispenser from the control station;

means for re-filling said dispenser with said agent; and

means for recognizing the identifier of a user for admitting said dispenser to the control station after use and recording the amount of said agent used to re-fill the dispenser after use.

44. The combination of claim 43 and wherein:

said control station further comprises means for recording in said processor the date and time that the re-filled dispenser is released from the control station to the user, and means for recording in said processor the date and time that the control station admits said dispenser returned after use by said user.

45. The combination of claim 43 and wherein:

said means for recognizing an identifier is arranged to preclude admission of a dispenser to the control station unless an identifier is first recognized by the processor.

46. The combination of claim 43 and wherein:

said control station has agent quantity measuring means operable with said dispenser and coupled to said processor to measure the quantity of said hand cleaning agent used in re-filling said dispenser.

47. The combination of claim 43 and wherein:

said dispensers are portable, sized to be held in the hand, with the actuator operable by a part of the holding hand.

48. A method for monitoring personal usage of a hand sanitizing material dispenser and comprising:

filling a portable dispenser of known storage capacity, with a hand cleaning agent to be dispensed from the dispenser;

responding to recognition of an authorized user identifier, to release said dispenser after filling, to the custody of the authorized user identified by said identifier; recording the date and time that said dispenser was released to said authorized user; recording the date and time said dispenser was returned by said authorized user; and recording the quantity of hand cleaning agent used from said dispenser between the date and time that said dispenser was released to said user, and the date and time said dispenser was returned by said user.

49. The method of claim 48 and further comprising:

using an identifier on said dispenser and which is unique to said dispenser, to distinguish said dispenser from all other dispensers; and recording the unique identifier along with the date and time recorded for its release to the authorized user and along with the date and time of its acceptance upon return by the authorized user.

50. A method for monitoring personal usage of a hand sanitizing material dispenser and comprising:

providing a plurality of substantially identical portable dispensers of known storage capacity; providing for each dispenser, a unique identifier distinguishing each of said dispensers from all others of said dispensers; collecting said dispensers in a stack in a control station; providing a dispenser filling station at the bottom of the stack;

filling said dispensers from the stack, one-at-a-time, after the dispenser to be filled has descended to become the bottom dispenser in the stack; and

responding to recognition of an authorized user identifier, to release said dispenser after filling, to the custody of the authorized user identified by said user identifier;

recording the released dispenser identifier and the date and time that said released dispenser was released to said authorized user;

responding to recognition of said authorized user identifier, to accept return of said released dispenser;

recording the date and time said released dispenser was returned by said authorized user;

and

recording the quantity of hand cleaning agent used from said released dispenser between the date and time that said dispenser was released to said authorized user, and the date and time said dispenser was returned by said authorized user.

51. The method of claim 50 and wherein:

the quantity of agent used is determined by measuring the volume of agent used to re-fill said released dispenser after its return to the control station.

52. The method of claim 50 and wherein:

the weight of a dispenser full of cleaning agent before release to an authorized user is stored in computer memory;

the dispenser is weighed after return; and

the quantity of agent used is determined by comparing the weights.

53. A hand treatment agent dispenser comprising:
- a housing;
- a replaceable cartridge for storing the agent;
- means on said housing coupled to said cartridge for discharging said agent from said cartridge and out from said dispenser;
- said cartridge being replaceable in said housing by another cartridge without tools; and
- said cartridge being adapted to organization with other like cartridges in a control station for sequential release from such control station.
54. The dispenser of claim 53 and wherein:
- the cartridge has a unique identifier.
55. The dispenser of claim 53 and wherein:
- at least a portion of said cartridge is flexible and thereby deformable by said means for discharging said agent.
56. The dispenser of claim 55 and wherein:
- said means for discharging is isolated from the agent contained in said cartridge to avoid contact of said means for discharging with the agent in said cartridge.

57. The dispenser of claim 53 and wherein:  
said cartridge has multiple agent storage compartments therein.

58. The dispenser of claim 57 and wherein:  
said cartridge has a unique identifier.

59. The dispenser of claim 57 and wherein:  
each compartment of the majority of said compartments has an agent storage cell therein  
which contains a unit dose of hand cleaning agent and is isolated from each other of said  
compartments to avoid contact of the agent in any of said compartments with the agent in any of  
the other of said compartments.

60. The dispenser of claim 57 and wherein:  
the cartridge is arranged in the housing for movement of said compartments relative to  
said means for discharging, to enable discharge of said agent from said compartments  
sequentially.

61. The dispenser of claim 57 and wherein:  
the cartridge has a rotatable platform in which the compartments are arranged in a circle  
around an axis of rotation to advance the compartments relative to the means for discharging to  
enable discharge of said agent from said compartments sequentially.

62. The dispenser of claim 61 and wherein:  
the housing has a piercing edge thereon in the path of a portion of each of said cells as the platform is rotated in the housing.

63. The dispenser of claim 61 and wherein:  
the housing has spring means to assist rotation of the platform; and  
the housing has means for limiting rotation of said platform in steps.

64. The dispenser of claim 62 and wherein:  
the cartridge has a circular outside wall with an aperture in said wall, said portion of each of said cells protruding through the aperture in the wall in which the cell is located;  
the piercing edge being oriented to pierce said portion when rotationally advanced against the edge to enable dispensing of agent from said cell.

65. The dispenser of claim 64 and wherein:  
the housing has a nozzle at said port,  
said outside wall of said cartridge being proximate the port, and the said cell portion being in direct communication with said nozzle when pierced for direct flow from a pierced cell out from the dispenser through said nozzle.

66. The dispenser of claim 59 and wherein:

said cells are made from an elastomeric material deformable for dispensing agent from a cell in a compartment by external application of force to the cell, but sufficiently resilient to recover from said deformation and close the portion pierced following removal of external force.

67. The dispenser of claim 61 and wherein:

said means for discharging said agent include an arm with a presser foot, said presser foot having a normally closed position in said housing and received in a vacant compartment in said platform, but releasable to an open position for activation to register with and deform one of said cells in said cartridge to eject hand cleaning agent from said cell.

68. The dispenser of claim 67 and further comprising:

a spring in said housing and which normally urges said arm and presser foot to open position; and

a second spring urges said platform in a rotational direction about said axis; and  
said foot and said platform have platform advance stops thereon cooperable to control  
advance of said platform during operation of said arm to place said foot in registry with said  
cells, one-at-a-time, enabling said arm and foot when the foot is placed in registry with the cell,  
to eject said agent from said cell as the arm and foot therewith is pressed from said open position  
to said closed position.

69. The dispenser of claim 53 and wherein said means for discharging include:  
a member operable on at least a portion of said cartridge for compression thereof to  
dispense agent from said cartridge portion.

70. The dispenser of claim 69 and wherein:  
said cartridge includes multiple compartments, and  
said means for discharging includes a presser foot operable by said member in said  
compartments one-at-a-time to dispense said agent.

71. The dispenser of claim 70 and wherein:  
portions of said compartments are made of elastic material deformable by said presser  
foot but self-restorable to self-close apertures in said portions following the dispensing of said  
agent therefrom.

72. In a system for monitoring hand cleaning activity, the combination comprising:  
a plurality of hand cleaning agent dispensers, each dispenser having means for storing  
hand cleaning agent, and having means operable, when actuated, to cause a dispensing event to  
dispense the hand cleaning agent from the dispenser;  
a control station having means for storing hand cleaning agent for said dispensers;  
means for recognizing an authorized user of said dispensers and enabling said control  
station to release hand cleaning agent from storage in said station to said authorized user upon  
request; and  
means to record the time and date of release of hand cleaning agent to an authorized user.

73. The combination of claim 72 and wherein:

said control station means for storing hand cleaning agent includes at least one replaceable hand cleaning agent containing cartridge for said dispensers.

74. The combination of claim 73 and wherein:

the replaceable cartridge has a unique identifier.

75. The combination of claim 73 and wherein:

said replaceable cartridge has multiple agent-containing compartments therein, each of said compartments having said hand cleaning agent therein isolated from hand cleaning agent in each other compartment so that agent in one compartment does not normally communicate with agent in another of said compartments.

76. The combination of claim 75 and wherein:

said compartments have hand cleaning agent containing cells therein, at least portions which are resilient and compressible by application of external force to eject said agent from said compartments through apertures in said compartments, but having sufficient recovery from depression to re-close said cells following release of external pressure.

77. The combination of claim 72 and wherein:

said dispensers are refillable, and

said control station is adapted to refill said dispensers and release said dispensers when refilled to authorized users sequentially.

78. The combination of claim 77 and wherein:

said dispensers having unique identifiers.

79. The combination of claim 77 and wherein:

said control station means for storing include a fluid reservoir; and

said control station has means for delivering said hand cleaning agent from said reservoir into said dispensers.

80. The combination of claim 79 and wherein:

said means for delivering include a pump.

81. The combination of claim 80 and wherein:

said dispensers are refillable.

82. The combination of claim 72 and wherein:

said means for storing hand cleaning agent on said dispenser is a replaceable cartridge containing said hand cleaning agent; and

said control station means for storing said hand cleaning agent is a plurality of said cartridges for said dispensers.

83. The combination of claim 82 and wherein:

each replaceable cartridge has a unique identifier.

84. In a system for monitoring hand cleaning activity, the combination comprising:  
a plurality of hand cleaning agent dispensers, each dispenser having a housing and means  
storing hand cleaning agent, and having means operable, when actuated, to cause a dispensing  
event to dispense the hand cleaning agent from the dispenser;  
a control station having means for storing said dispensers; and  
means for recognizing an authorized user of said dispensers and enabling said control  
station to release at least one of said dispensers to said authorized user upon request.

85. The combination of claim 84 and wherein:

each of said dispensers has a unique identifier.

86. The combination of claim 84 and further comprising:  
means coupled to said means for recognizing, to record the time and date of release of  
said at least one of said dispensers to an authorized user.

87. The combination of claim 85 and further comprising:  
means coupled to said means for recognizing to record the time and date of release of  
said at least one of said dispensers to an authorized user.
88. In a system for monitoring hand cleaning activity, the combination comprising:  
a plurality of hand cleaning agent dispensers, each dispenser having means storing hand  
cleaning agent, and having means operable, when actuated, to cause a dispensing event to  
dispense the hand cleaning agent from the dispenser;  
a control station having means for storing hand cleaning agent for said dispensers, and  
having means to release hand cleaning agent from storage in said station to a user upon request,  
and having means to record an identifier for the release request along with the time and date of  
release of said hand cleaning agent to the requesting user in response to the request.
89. The combination of claim 88 and wherein:  
said dispensers are refillable, and  
said control station is adapted to refill said dispensers and release said dispensers when  
refilled, with each of the dispensers having the unique identifier recorded by said means to  
record.

90. The combination of claim 88 and wherein:  
said control station means for storing hand cleaning agent includes at least one  
replaceable hand cleaning agent containing cartridge for said dispensers; and

said control station is adapted to store a plurality of said cartridges and release said hand cleaning agent upon request in said cartridges, one cartridge per request, each cartridge having a unique identifier recorded by said means to record along with the time and date of release of the cartridge by the control station.